1915

THE COLONY OF SEYCHELLES.

VISIT TO THE OUTLYING ISLANDS.

BY THE GOVERNOR

ACCOMPANIED BY THE DIRECTOR OF AGRICULTURE

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The Outlying Islands of the Colony.

I took the occasion of an opportunity offering to make arrangements to visit certain of the Outlying Islands. A personal visit would enable me to see conditions for myself and to judge of these to some extent on such questions as labour conditions for instance but the Islands are in the main cocoanut plantations and I felt that the usefulness of a visit would be greatly enhanced by having with me an Agricultural Expert. I asked Mr P. R. Dupont, the Director of Agriculture, therefore to accompany me. He went very carefully into the conditions of each Island, all of which he had visited at various times in the past, and I commend his Report to the serious attention of owners and lessees of the Islands with which he deals and others interested.

I had also invited Lt. Commander Jephson of H. M. S. "Emerald" to form one of the party but unfortunately he was unable to come.

We left Mahé on the afternoon of Monday, July 15th, and visited the following Islands in the order named :—

Coëtivy, Alphonse, Providence, St. Pierre (in passing), Astove, Cosmoledo, (Menai), Assumption, Aldabra, Des Roches, Poivre and back to Mahé which we reached in the afternoon of August 16th. Direct chart measurements give a distance of 1562 miles but the actual distance travelled was 2211 miles by observation and the log. Our only two logs were taken by sharks.

Our ship "The Halland", three masts, schooner rigged, 225 tons, had no auxiliary power. Captain Guldvog, the master, is however an expert sailor and no time was lost except to the extent that contrary winds made some loss inevitable. The ship belongs to the estate of the late widow Hadee, which also owns some of the Islands visited.

I made a point, wherever possible, of seeing and speaking to the labourers. Their health and physique was good and beyond one or two minor accidents and ailments there was no sickness whatever. Complaints were rare and then not serious, and Mr Dupont, who was also invested with the powers of Visiting Magistrate, had little work to do in this capacity.

I was informed by the Managers that "Bacca" drinking was not indulged in to excess. While materials were there in the shape of pumpkins, lentils, etc., an essential ingredient, namely sugar, was not obtainable—beyond the ration allowed—except by purchase in the discretion of Manager. Unfortunately on return to Mahé the accumulated savings of 18 months work—sometimes considerable—are dissipated almost at once. There may be some means of minimising this evil but as most of the labourers are entirely improvident and will get some sort of drink somehow and somewhere the demand will always create the supply—if not open then illicit.

The only cattle we saw were at Coëtivy. They did not do well, owing it was thought to the brak nature of the water, obtained from wells, but there may be other causes. All forms of poultry and pigs thrive. Fish are abundant everywhere and in some localities green turtle.

Referring to turtle I had one weighed with the following results :—

Live weight ... ... 264 lbs.

Edible meat after killing—80 lbs (without flippers). This 80 lbs of fresh meat sold on the market at Mahé dried would be found to have shrunk, so I was told, to 25lbs or so, including calipee. I do not know in how far these figures would represent a general average but the weights given above corroborate previous information.

I was surprised to find that, generally speaking, no rainfall records were available on the Islands, since rain gauges are not kept. The value of definite information on this point is apparent, and I hope to make arrangements whereby gauges can be supplied at a small cost to all the Islands and records kept and sent for record here by the Government. Judging by the tanks at Assumption and Aldabra, drinking water should never be a serious question in development as the provision of adequate tanks would not represent a very large capital cost. This applies more particularly to the "raised coral Islands". In the other Islands water—not entirely fresh but drinkable—can be got by digging.

Another point for the Government and for the owners and lessees of Islands is this. Wherever there is a watchman—and on every Islands there is at least one—a raised light should be kept burning all night. This can be done at small cost, a few rupees per anuum. Every Island, without exception, is fringed with coral reefs. Currents are strong and variable. It is unlikely, had this system been observed, that the latest ship to suffer, "The Norwegien", would have gone ashore at Astove. I feel sure that the point has only to be mentioned to receive the ready acquiescence of owners and

in fact their support of appropriate legislation on the subject. The Port Officer advises that a white light only should be shewn so as not to be mistaken for a vessel's side light.

I should add here that our sympathies were deeply stirred on learning, on our arrival at Astove, that Captain Oslen of "The Norwegien" had been drowned later in landing through the surf. His body was recovered and buried in the Cemetery at Astove. After five years service he was about to proceed home to Norway to get married. The sympathy of the people of the Colony will be with his parents and betrothed.

Formation of the Islands. This is interesting in that, while all are of coral formation, you have the ordinary cocoa-nut plantation Islands, in which the coral is level with the sea and upon which sand has deposited with the centuries. Then St Pierre and the other Islands nearer the African Coast have been raised by some convulsion of nature and so have lost the benefit of the tides inasmuch as these have been unable to reach over and deposit what now forms (with other ingredients) the soil of the plantation Islands. I notice that Mr Dupont favours the theory that all were at one time "raised" Islands and that the "plantation" Islands have been worn down to their present level by tides and erosion. This, I understand, is the conclusion arrived at by geologists, though the ordinary layman, like myself, would have thought that most of the "Plantation" Islands had been formed as one sees the formation of new Islands proceeding to-day, as for example Cerf Island, near Providence. However the question, in its geological aspects, is an academic one to planters, who are concerned in the effects rather than in the causes.

Each Island has its own interest, and, in a large number of cases, its own similarity to others, with their problems in common. But Aldabra is different. We were there only a few days and were able only to explore the fringe of things in the time. Even our small attempt entailed the expenditure of considerable effort in lifting one foot after the other from the mud of the mangrove swamp and the gritty coral sand of the sea. This was compensated for, however, by the most beautiful scenes, to which Mr Dupont has made reference. I hope at some future time to make a stay long enough, with the experience we gained, to make a more elaborate survey.

I hope planters will particularly note the advice of the Director of Agriculture regarding the use for their own trees of existing guano deposits.

One further point occurs to me, which I had in mind in visiting the Islands. That is the danger of visiting ships from Mauritius and other infected Islands bringing in the malaria mosquito—one of the anopheles family. Such ships cannot visit the Islands direct without the consent of the Government, the

withholding of which might cause hardship on occasion. However, from my observation, it seemed to me that, where any danger of infection might exist, a provision requiring the ship to anchor at a distance of not less than one mile, should prove a sufficient safeguard, though such a condition could not be observed in the case of all Islands owing to the fact that a few would not afford anchorage so far out.

In conclusion our thanks are due to the Managers of Islands (and where they were present to their wives) for a most hospitable reception everywhere. It was not possible, except in the case of one or two, to notify them beforehand of the visit. The necessarily enforced inaction on board the ship was rendered the less monotonous by the company I was fortunate enough to have in Mr Dupont and Captain Guldvog.

The Report of the Director of Agriculture is subjoined. Its value is not affected by the fact of its having been written from a bed of sickness, owing to an illness which, I fear, was aggravated by the voyage.

D. HONEY,
Governor.

Report on a visit of investigation to the principal outlying islands of the Seychelles Archipelago.

CHAPTER I.

General Remarks.

Your Excellency,

In compliance with Your Excellency's instructions, I accompanied Your Excellency on a visit to the principal outlying islands of the Seychelles archipelago with a view to ascertaining the kind, amount and conditions of work carried on thereon and of obtaining a definite insight into the agricultural and industrial prospects of these islands.

The annexed sketch (plate I) shows the itinerary which in consultation with the Captain of the Schooner Halland (Mr L. Guldvog) it was arranged to follow. The programme was fully adhered to during the voyage which lasted 32 days from 15th of July to 16th of August 1929.

It is not the first time that it has been my privilege to visit these islands, none of which were unknown to me. I have on several previous occasions been appointed to survey the resources and agricultural capabilities of those that had not yet been developed when I started my investigations in 1904.

These outlying coral islands can be divided into 5 groups :—

The Mahé group consisting of :—

1. Coëtivy, Plate, Dennis and Bird which are on the edge of and a short distance from the Mahé bank.
2. Amirantes 130 miles S. W. of Mahé.
3. Alphonse group 250 miles S. W. of Mahé.
4. Providence group 420 miles S. W. of Mahé.
5. Aldabra group 630 miles S. W. of Mahé.

It was decided to visit Coëtivy first, this island being the most S. easterly one. It would have been impossible to reach it on the return voyage during the S. E. trade winds without spending much time beating up against the wind. Even as it is, we had to steer a long distance to the East, up to longitude 60 °, making several tacks to Coëtivy which we reached after a trying voyage of 7 days.

It is more convenient to describe the islands one by one in the order in which we visited them, although they can be divided into natural groups classified in accordance with their structure and natural conditions.

All the islands of the S. Indian Ocean belong to two classes which Mr Fryer adopted in the book he wrote in 1909. Other investigators who had visited them previously, had classified them in the same way :

1. Low lying Flat Islands, which are sand cays.
2. Elevated reefs still in their position of growth.

It is not necessary to go into the details by which this differentiation is made or to explain more fully the structure and formation of the islands. But in order to understand their comparative agricultural possibilities it should be borne in mind that they have all appeared above the level of the sea in the same way and that they have all been at one time elevated reefs. After erosion by sea and rain water had gone over long periods many of them were cut down to sea level and on this foundation sand was piled up by waves and wind to form sand cays. It therefore often happens that a whole island is partly an elevated reef and partly a sand cay, depending on the time on which the erosion has taken place and to the amount of its exposure to winds and currents.

It is believed that all these reefs were elevated by volcanic action or in other words that the foundations on which the corals have built their structure were mounds raised by volcanic action to the depth at which the corals begin to grow. This elevation might have been assisted by a corresponding drop in the level of the S. Indian Ocean caused by the attractive force of the mountain masses of Africa, or of the great ice cap in the Antarctic seas. But this is an academic question which has not been settled, although there is evidence all round the Mahé group that in geologically recent times corals once flourished where now there is dry land ; remains of them are still to be seen at least 30 feet above present sea level.

A drop of the level of the ocean of 30 feet would account for the appearance of many islands above water but it is difficult to admit that others, which show evidence of having been elevated to 50 or 60 feet above sea level, have made their appearance without some volcanic disturbance under the sea. During the Percy Sladen expedition in 1905, Professor Stanley Gardiner managed to get specimens of rock at the bottom of the sea off Providence reef below 700 fathoms ; they were of volcanic origin. This is the only evidence of the geological character of the mounds on which our Outlying Islands are built.

Mr Fryer's paper, which is part and parcel of the investigations made by the Percy Sladen Triest expedition

published by the Linnean Society, gave the layman an excellent idea of the structure of our outlying islands and of their past history. But what is more important to know from an agricultural and geological standpoint is the future history of the sand cays or coconut islands. During the trip, I was enabled to make the following observations, after comparing the islands with one another:

When once a sand cay had been formed, migratory birds flocked together to them. They still do so in great numbers, but they are supposed to have been even more numerous during the glacial period which compelled those of the temperate regions to take refuge near the equator. These birds, especially the boobies and gannets, formed considerable deposits of guano on many of the sand cays, which at the same time increased in area by the piling up of more and more coral sand round their periphery. Guano in the tropics is the seat of many alterations; all the fermentable matter being washed out by the rain, leaving behind a phosphatic rock. In this process of metamorphosis, solutions of lime with a small percentage of ammonium phosphate cement together the particles of sand of the soil and form a conglomerate. Another kind of conglomerate is also formed near the water table by a similar process of cementation. Lime in solution in rain water charged with carbonic acid derived from the atmosphere or from guano deposits, is the cementing agent of all our sandstones. The process can be followed in the formation of beach sandstones which in many outlying Islands are so welcome as an addition to the building material for houses.

These hardpans, or "pavés" or "platins" as they are called locally, begin as small conglomerates, but they soon increase in bulk and after some time the whole ground is a mass of conglomerate as hard as limestone during the dry season. One can imagine that the intrinsic value of an island depends on the extent to which the sand has been cemented into conglomerate; in some cases it forms walls 6 feet deep, and in others, it is restricted to nodules or slabs about the thickness of a man's wrist.

Our islands become gradually but surely consolidated into rocky islands when no measure is taken to combat the formation of hardpans. While a few islands of this archipelago are free almost entirely from hardpans, others have a great part of their area transformed into sandstones in which coconut palms are so much handicapped that they stop bearing even their undersized nuts after some time and sometimes die off.

I shall now proceed to describe the islands visited which, together with the other outlying coconut islands of the archipelago, produce as many as 10,000,000 nuts per annum, or nearly 1/3rd of the crop of the colony.

	Area in acres under cultivation.	Annual crop.
1. Coral islands 1 Flat islands ...	5,710	9,624,000
2 Elevated reef islands..	400	300,000
Total ...	6,110	9,924,000
2. Mahé and neighbouring granitic islands ...	15,000	18,058,000
3. Praslin and neighbouring islands ...	7,130	8,464,000
	28,240	36,446,000

The area under coconut on the coral islands is at the most 1/3rd of the area occupied by the palms in the other two groups of granitic islands. In other words 2 to 3 times more nuts per acre are produced in the outlying islands as compared with the main islands of Mahé and Praslin which are the only oceanic islands in the world of granitic formation; granite being a continental rock.

Not only are the outlying coral islands producing 2 or 3 times more nuts per acre than the other islands, but they can also be made even much more productive owing to numerous guano deposits they contain and to the possibility of fisheries being developed round them which would supply an additional amount of fish manure to the palms. In the granitic islands the soil has been impoverished in the past by wrong methods of cultivation, bush fires and shifting cultivation, and except in a few places near the beach, the soil is too shallow for coconut palms and the consequence is that the palms are more exposed to shortage of crops and to diseases than on the madreporic islands.

CHAPTER II.

Coëtivy.

We reached Coëtivy at 4 p.m. on the 22nd July 1929 and stayed there until the forenoon of the 25th.

This island is the largest sandcay in the Colony measuring about 5½ miles long. It tapers to a point in the South but is nearly 2 miles in width in the North. It was originally a smaller island surrounded by reefs which were awash of low water. Sand has been piled up on the reefs from North to South. I s area has gradually extended in that way and is still extending.

At some distance from Coëtivy, which is already surrounded by so many reefs, there is a huge bank known under the name of Fortune Bank (vide plate I). These numerous banks place Coëtivy, which is so near Mahé, in a singularly good position as regards the eventual development of fisheries in the Colony. Much of the future of these islands depends on the development of these fisheries from which fish manure would be obtained for the manuring of coconut palms which cannot remain unmanured any longer. I was surprised to learn that only a few turtles and carets were captured at Coëtivy while so many of these reptiles are captured at Plate Island which is midway between Coëtivy and Mahé. The banks near Coëtivy are deeper than the banks near Plate Island ; but at both places they seem to be alive with fish, sea weeds and other organisms so that no explanation of the difference in the resources can be given until a closer comparative examination of both reefs is undertaken.

Coëtivy is at a distance of 160 miles from Mahé and is nearly in a line with Plate Island (80 miles from Mahé) and with Agalega (300 miles from Mahé). Plate was always a dependency of the Seychelles but Coëtivy was until 1908 a dependency of Mauritius, and Agalega still belongs to Mauritius which is 630 miles away. Judging from the results obtained at Coëtivy since it was annexed to Seychelles which show that the crop went up gradually from 80,000 nuts a month in 1917 to over 200,000 in 1928, there is no doubt that it would be far better for the owners of Agalega to have their Island worked from Seychelles as headquarters than from Mauritius. Professor Stanley Gardiner in his publications pointed out in 1906 the mistake which is made by working Islands of the Seychelles archipelago from Mauritius instead of from Mahé : in the one case the cyclone belt must be crossed, in the other, not. Currents, winds, labour are also much in favour of Seychelles being the headquarters of all these dependencies of Mauritius, and it can only be a question of time before they will be all annexed to the Seychelles for the benefit of both communities. If all the Islands of the Seychelles and Chagos Archipelagos were united under one Government, the means of developing these Islands would be increased while at present half the resources only are exploited by one of the two colonies and these resources,

divided into 2 parts are too small to allow, for example, a steamer visiting regularly all the Islands, as it would be the case if the resources were combined.

Much depends on rapid means of communication and control for the steady development of the resources of all these Islands.

Coëtivy is worked from one settlement which is near the South end while the largest planted areas are near the North end. I reckon there are 2,000 acres under coconut palms. This is much too large an area to work from one settlement. The island should evidently be divided into two sections and a new settlement started half way between Puits Goudron and the West Coast where vessels can be loaded. The necessity of dividing the work did not escape the attention of the owners as I noticed a new copra curing house at Puits Goudron which did not exist in 1927 at the time of my previous visit. It took us 1½ hours to reach Puits Goudron which is not the extreme end of the island and the same time to come back. A labourer cannot walk over during 3 hours of the day when he works only from 6 to 12 for his day's work.

Coëtivy having been rather a small island when there were more birds in the archipelago, very little guano is found on the whole island, but the deposits which occur in some places should be carefully preserved as they will be required constantly for the manuring of the coconut palms that are growing in the newly formed sand cays where there is no trace of guano. Without guano and other organic matter derived from sea weeds or fish manure no coconut culture can be undertaken as a permanent proposition, although the palms may flourish temporarily where the sand after having recently emerged from the sea is still full of shell debris.

The limited amount of guano accounts for the absence of the surface hardpans which occur only near the guano beds at Coëtivy, while the bottom hardpans are just about to form and appear here and there in patches. This places the island in a singularly good position as regards future manuring which has not yet begun, although holes for manuring have been dug at the foot of at least 4,000 coconut palms.

In spite of the island having not been manured as yet and its neglected condition which goes to show that only about 150 acres of palms had been properly cleared from thicket and dirt prior to our visit, with 1,650 acres remaining to be cleaned, yet the crop has increased 3 fold for the last 10 years. This is partly accounted for by the young trees having come gradually into bearing during that time and replaced the old ones that were more or less barren and which have been done away with in many places.

There are still thousands of palms which are yellowish and stunted, while many others, here and there, are the best that I have ever seen in the archipelago. Such a difference in the behaviour of the trees is due to the neglected conditions of the estate which is a wilderness in many parts, where not only are the palms exposed to insect and fungus parasites which are harboured by the jungle trees, but where the undergrowth is so thick that many nuts are lost in picking.

Such a huge estate free from hardpans is the ideal place for the working of tractors, the whole area being ploughed and manured on the surface, instead of having all these big holes dug on one side of the trees which is a necessity, as far as manuring is concerned, on islands full of hardpans, but which does not apply to islands which are sandcays free from sandstones.

At the time of our visit there were only 59 labourers working on the island, besides 17 boys and 19 women. This island is understaffed. Considering the increase in the crop for the last 10 years one would be justified in doubling at least the present number of labourers.

Such a promising island should be run on less haphazard lines, and more attention given to the technical side of the work. Better curing houses for copra should be built with the abundant sandstones and made more permanent than the structures we have seen on that island. The question of manuring should be taken up without further delay. The amount of guano (earth and rock guano) should be measured, so as to put aside the quantity of manure which is required yearly on the island, section by section. The sea weeds should be collected and the fisheries developed. If the resources in manure are very small, there is no need in digging large holes which it would be impossible to fill up. These large holes which have been so beneficial on the islands where a hardpan choked the roots of the palms are not essential for the manuring of the trees at Coëtivy, where the soil is sandy altogether. By digging large holes 10 feet in diameter a great proportion of sand from the subsoil is dug out and spread on the surface. With a limited amount of manure, such as at Coëtivy, it is risky to mix the subsoil with the soil as much more manure is required to bring the mixed soils into a good condition of tilth, instead of manuring the soil itself. Large holes are only imperative when the hardpan prevents the roots from penetrating into the subsoil to reach the water table.

It is only in case of extreme shortage of manure that the theory of digging holes for manuring applies, but then these holes should be dug carefully to receive the available manure, but not turned into wide trenches which need tons of manure in all cases.

The presence or absence of a hardpan in the ground is of such paramount importance in the culture of coconut palms in the coral islands that all the managers should be conversant with its process of formation. Sometimes it just begins to form and is hardly visible to the eye, but this small layer of conglomerate can well interfere with the transpiration of the coconut palm by preventing the roots from reaching the water table. I have seen many islands, including Coëtivy, where holes have been dug out near coconut stems without having afterwards been filled up with manure or vegetable debris and yet the palms seemed to have benefited from the presence of these holes, although many roots of the tree had been severed and exposed to the sun. In such cases one is almost sure that a certain amount of conglomerate was present and that the coconut roots did not find their way to the water table and conversely that the water from the subsoil, which was isolated by the hardpan, did not find its way to the upper layer of the soil by capillarity. The soil is very dry for long periods in these outlying islands and the capillary movement of the water underground has not to be interfered with.

I am also under the impression that in depressions of ground where the soil is moist, trench drainage should be practised in those places where the hardpan occurs, as the underground water accumulated on top of these conglomerates becomes putrid and smells of sulphuretted hydrogen which is poisonous to plant roots.

CHAPTER III.

Alphonse Group.

We reached Alphonse on the 27th of July at 12 midday after a voyage of 48 hours from Coëtivy. We landed immediately and remained ashore until 5 p.m. and then resumed our voyage to Providence.

Alphonse was acquired in 1926 by Messrs Temooljee & Co from the Mahé Syndicate which had been in possession of it for 20 years. It is a group of three islands (vide plate III). Since 1907 I had visited it 4 times before this trip, and was more than ever impressed with the masterly way in which it has been worked since then.

Alphonse proper is an island of 360 acres in extent surrounded on all sides, except one, by a shallow reef which extends seawards to at least a mile distance and which is covered by a luxuriant growth of sea weeds, mostly Cymodocea. Towards the North there is a deep barachois (7 to 8 fathoms deep) close inland with a passage over the reef where vessels can anchor. The existence of such a barachois is

quite uncommon in Seychelles waters, although a second instance occurs at Plate Island where there is a barrier reef. The other two islands of the Alphonse Group are Bijoutier and St François which are the only portions of land on the rim of a submerged atoll, 8 miles in diameter, to the South of Alphonse. Between Alphonse and the atoll there is a very deep channel about 1½ miles wide known under the name of "Canal de la mort". This name is derived from the very rough and risky passage which one has to experience in crossing over in pirogue from Alphonse to Bijoutier.

The two islets occupy the two extreme ends of the atoll of Bijoutier to the North and St François to the South. Two wide passages in the North lead inside the lagoon which dries up at low water in parallel lines. A new sand cay has emerged lately above high water near St François.

The two islets of the atoll were not visited by us, but we passed close to them and we formed an idea of the luxuriant appearance of the plantations which add 5,000 nuts to the monthly crop of 90,000 nuts for the group.

I do not think that they cover more than 25 acres of land, while the atoll itself extends over 30,000 acres and affords very important fishing grounds to the inhabitants. When one considers that Alphonse, with its two satellites, covers about 400 acres of land only, and that a crop of 95,000 nuts a month, or over a million nuts per annum is harvested on them, one is struck by the importance of the small madreporic islands of the colony, as far as coconut culture is concerned, as compared with the granitic islands where 2 to 3 times more land is required to produce the same number of nuts.

I have often borne testimony to the system of culture adopted at Alphonse which can be given as an example to be followed in other parts of the Colony. About 24 years ago when the Mahé Syndicate purchased these islands they were producing 25,000 nuts a month and even this crop was considered by the then proprietors as being the maximum crop obtainable. The plantations had been wrongly made in small holes on the surface of the ground and a great number of palms alongside the beach were yellow in appearance and considered hopelessly chlorotic. The work of breaking up the "pavés" with crow bars, opening large holes next to the trunk of the palm and filling them up with guano and rubbish accumulated on the ground for centuries was taken up methodically under the able guidance of the manager of the Mahé Syndicate. Within 15 years the crop was quadrupled, the badly set out trees removed and new ones planted at the right distance apart. The result is that there is to-day no existing plantation in the Colony showing the same luxuriant appearance and so much freedom from disease and insect pests.

There has never been a sign of bud-rot disease on the island, although the little leaf and the stem bleeding diseases have occurred in the past. A visit to the present plantations is a never ending source of delight to a visitor, as there is nothing more striking in the vegetable kingdom than young coconut palms in full bearing with clean stems, several hundreds of nuts hanging down between the branches and a clean glade of carpet grass between the palms.

The structure of Alphonse is not very different from that of Coëtivy. The sand newly piled up on the beach is coarse and very porous and harbours very few "pavés" which are mercilessly removed when they occur in patches. Towards the centre of Alphonse where guano accumulated in the past on an area of about 30 acres, surface "pavés" are emerging everywhere forming walls 6 feet deep right down to the water level. The contrast between the plantations still existing on this piece of land and the other new plantations above described is striking. They remind one of the sickly trees of Mahé full of vermin and insects pests, yellowish, stunted and strikingly barren. The manager informed me that the idea of manuring these trees was given up owing to the prohibitive cost of breaking through hardpans 6 feet thick, grinding the "pavés" removed into sand and setting out new plantations. But one is inclined not to tolerate 30 acres of the worse trees in existence being found in the middle of 360 acres of a model plantation.

Nowhere can the striking influence of guano on the formation of hardpans be studied to better advantage than at Alphonse. I am afraid that the lot of many other islands will be the lot of that part of Alphonse which has been rendered barren and uncultivable by the formation of hardpans. The coconut planter in madreporic islands of Seychelles has therefore to realise that he has to get rid of the "pavés" by all means at his disposal before they have acquired a bulk which brings sterility to the islands under his charge. The "pavés" will not allow the coconut roots to reach the water table and to spread laterally in search of food, the palm soon becoming chocked, as if it were growing in a flower-pot.

What has been done at Alphonse can be done elsewhere. Very little progress remains to be done. I am however inclined to think that perhaps the coconut palms on that island are suffering from an ill-balanced food ration and that too much rubbish has accumulated on the ground for an easy cultivation of the land. It is rightly believed there that, under any pretence whatever, rubbish should not be burnt under the shade of young coconut palms. This always causes the crop of nuts to fall prematurely sometimes for a period of 2 years in succession. By breaking through the "pavés" and manuring by means of guano only, which supplies phosphate and a little nitrogen, not enough consideration was given to the supply of potash to the

palms and this deficiency has been the more pronounced that rubbish has never been transformed on a great scale into ash at Alphonse, from which a supply of potash could have been derived, not to speak of sea weeds which abound on the coast. It is all very well to improve the physical conditions of the soil and subsoil by breaking through the hardpan and removing it down to water level and also manure the palms with phosphate and nitrogen. The palms in that way grow quickly, too quickly perhaps; but what about their requirements in potash which is a predominant factor in coconut culture? Nothing however would be more easy than to manufacture potash at Alphonse. All the rubbish should be burnt in heaps on the rocky portions of the island and turned into ash. Sea weeds can be subjected to the same treatment together with coconut husks of which the ash contains 40% potash. One should never forget the law of the minimum, as far as manuring is concerned, by which it is understood that when a food element exists in a minimum proportion, the other two food elements are absorbed proportionally to that minimum. It is therefore no use giving phosphate and nitrogen over and over again and leave potash out of sight, as the absorption of phosphate and nitrogen will be proportional to the low potash content found in the soil, and all additional portions of phosphate and nitrogen are made in vain.

Potash is also well known as being the food element in the soil which gives more fibre to the coconut palms and renders them more resistant to disease, potash helps always in the wood formation of the tree, while nitrogen is known as being favourable to its leaf development, and phosphate to its bearing power. There are signs already at Alphonse that the palms are very quick growing and that their fronds and inflorescences lack the necessary turgescence which is brought about by potassic manures.

The practice of digging large holes for manuring need not be repeated more than every 10 years, according to the results obtained at Alphonse. It is therefore advisable to remove and burn the rubbish and level the ground and in the 10 years' interval adopt the practice of ploughing the land by small ploughs driven by asses or mules or horses. Bullocks do not do at all on madreporic islands, owing probably to the drinking water from wells which contains up to 3 grammes of common salt per litre. Small ploughs would give the necessary tilth to the soil and potash from ash could be incorporated at the time of ploughing. Ploughing by means of tractors is out of place on small islands as these would be used only for a short period of time during the year, unless the motor engine during its spare time is used in connection with other mechanical works.

I was informed by the manager, with whom I discussed these and other problems, that the question of providing potash by burning sea weeds had not been lost sight of altogether by the former proprietors, who also did supply some potash to the soil in the form of coconut husks with which the new coconut holes for planting were lined to prevent sand from chocking them. Now that there is no room for other new plantations, the island having been planted all over, the question of supplying potash to the soil has assumed more importance than before. The manager has to exercise his own judgment. Husks which are produced to the amount of 95,000 a month should not all be transformed into potassic ash. A certain number have to be reserved and dug into trenches as they are the best organic matter available, of slow decomposition, which is so instrumental in preventing the hardpan from re-forming.

Chapter IV.

Providence.

We reached Providence on July 29th. The land was sighted at 7 p.m. on the 29th or 48 hours after we left Alphonse. An attempt to anchor was made during the night, but the anchor did not hold and we had to set sail again until next morning (vide plate IV).

At 9 a.m. we went ashore and visited one part of the island which is much like Coëtivy and Alphonse, as far as the structure and general appearance are concerned. It is a sand cay about 2 miles long and 500 yards wide measuring approximately 380 acres. It is widest in the middle and towards the north, but tapers to a point 30 yards wide towards the South. The contour of the island is exactly that of Coëtivy and, like Coëtivy, the island occupies the North end of a reef which extends 24 miles South. The South end of the reef which dries up all along in patches at low water, terminates into an island known under the name of Cerf Island. On the Admiralty chart, drawn up about 50 years ago, Cerf Island is represented by 7 sandcays arranged in a group mostly touching one another. The manager informed me and made a sketch showing that the same number of islets still existed, but that the old islets have joined together and new ones have emerged from the sea to make up the same number as before.

This means that Cerf Island has considerably increased in area. It has been acquired by the Company which owns Providence from Government some 30 years ago for the small amount of Rs 1,000, at a time when little was known concerning the resources of the Colony. It extends now over an area even larger than Providence and coconut palms set out gradu-

ally for the last 20 years have grown into luxuriant trees and are, according to the manager, quite as numerous as at Providence. They have come into bearing at 5 years and are producing 3,000 nuts a month, although most of them had been planted 10 to 15 feet apart. The weather was so squally during the whole time we stayed at Providence that the attempt to visit Cerf Island was given up. However, on the face of the information given to me by the manager, it seems incredible that an island of 400 acres should be left to itself without a permanent settlement and that it is only occasionally visited by the manager and a gang of men who have sometimes to remain 24 hours at sea before reaching it. One can imagine the resources in fish and birds which can be found on an island of that size together with 24 miles of reef in its neighbourhood. It is known as one of the best fishing grounds of the Colony, although nothing is done to exploit these sea resources, except by a few Chinamen who camp over there every 2 or 3 years for the capture and curing of trepangs on the share system.

As regards Providence itself the soil is uncommonly good, being formed of coarse sand right down to the water table into the whole depth of which coconut roots were found to be spreading. It is an ideal soil for the coconut palms. The conglomerates are just beginning to form, as shown by the lumps which were dug out when we opened a large hole right down to the water table. This condition applies to the South end of the island and to its periphery in the North. Towards the middle between the settlement and the North, all sorts of surface conglomerates can be found. As usual, it is that part of the island which first emerged from the sea and served as refuge for birds, and it is there that the conglomerates have acquired the maximum thickness forming walls 6 feet deep with guano beds still remaining available here and there to the amount of about 40,000 tons.

Attempts have been made and are still being made to export guano from Providence. This is a great mistake. Even if the phosphatic surface "pavés" forming walls 6 feet thick can be ground into earth guano, the total quantity of guano occurring at Providence should be strictly reserved for the manuring of the coconut palms on other parts, including Cerf Island, where it is totally absent from the ground.

It is often the custom in the outlying Islands to put a ton of guano into a large hole 7 feet deep into which a coconut palm is set out and to consider that this quantity of guano is not too much for the maintenance of the tree in good condition throughout its life-time.

This amount is excessive and is not based on scientific experiments. The requirements of a coconut palm in phosphate during 10 years are satisfied with a cwt of phosphate put into

the soil. It would be better to add a complete fertiliser guano, ash and sea weeds or fish manure and to manure at regular intervals than to use the heavy doses of guano above referred to. Excessive doses of guano besides lead to the formation of a hardpan. On the basis of 1 cwt per tree the requirements in guano on any island should amount to 4 tons per acre approximately. For an island of 800 acres like Providence including Cerf Island 4,000 tons of guano are required, say every 10 years. A total reserve of 40,000 tons is therefore in no way excessive, as it means a provision for 100 years or the life-time of a coconut tree in good health. It should also be borne in mind that nobody has the right to impoverish the soil which has been handed over to him by his ancestors, to the prejudice of his descendants.

I noticed that there was a shortage of timber and firewood at Providence where however this question was not lost sight of in the past, a line of huge casuarina trees, more than 70 years old, having been set out near the beach on the N. E. Coast. This example should be followed. Great care should however be taken in planting out timber trees which do not harbour scale insects, I found near the settlement a few bois chauve souris (Ochrosia Borbonica) and La Fouche (Ficus nautarum) which were the hosts of the cinnamon scale insect (Lecanium tesselatum) and also near the landing place a great many coconut palms attacked by even a more dangerous pest. (Aspidiotus dictyospermi). These two pests have evidently been introduced from Mahé and will spread at Providence, giving to the coconut palms that gloomy appearance which is the fate of palms attacked by scale insects, owing to the black sooty mould which develops in the excretions of the coccids. Steps should be taken to introduce the fungus parasites which keep in check both these insects at Mahé to a certain extent and to destroy and avoid planting any more Bois chauve souris and La Fouche trees which afford such a good breeding grouud to the insects in question.

I also noticed an aphis which was killing out the bushes of veloutier (Scævola Kœnigii) along the coast near the settlement. No better examples can be found of pests being introduced accidentally into small islands when their natural parasites are missing and where therefore they have still a better chance of doing harm. The introduction of plants of any kind and especially articles of food wrapped in baskets of coconut leaves should be severely prohibited and destroyed on board the ships which convey the labourers to these islands.

The timber trees and bushes already attacked at Providence should be destroyed and the coconut palm leaves also burnt in small heaps to avoid the pest from gaining ground, although it has spread far more already than it is believed.

While destroying these useless trees on the island it is as well that the thinning out of the palms themselves should be undertaken. The palms are growing very often at less than 10 feet apart and the usual mistake of setting out intercalary young palms has already been made, bringing the total number of trees per acre to at least 3 times the number which can be successfully grown. There is no stem beetle on these islands and the palms can live more than 100 years. What is the use then of providing for their eventual death, when they are 20 or 25 years old, by setting out several generations of younger palms between them? It is well known that coconuts should be planted at least twice the distance covered by their horizontal leaves.

On the whole, Providence Island is in the fortunate position of being able to hold its own for a number of years to come, owing to its important guano deposits. But this will give way some time or other and therefore the necessity of developing the fisheries for the sake of the manufacture of fish guano is as imperative at Providence as anywhere else.

It is the manager himself who should be abreast of the times and not depend, for example, on a gang of chinamen for the curing of "bêches de mer". This is a well known process of manufacture and so simple that anybody can do it. It is by gradually teaching the labourers how to deal with this and other small industries connected with fisheries that the vast resources of this island like Providence will be tapped to advantage for the benefit of the whole colony.

At Providence the coconut crop, including that of Cerf Island, amounts to 94,000 nuts per mensem. Double that crop can easily be obtained within a few years. The present crop represents a net income of at least Rs 20,000 a year. Out of this revenue a large sum should be set aside for the improvements that are urgently needed.

Chapter V.

St Pierre and Astove.

We left Providence on the 31st of July in the morning and passed within a cable length of St Pierre island, which is 18 miles away, on our route to Astove. It was not considered necessary to land at St Pierre which belongs to the Crown and is leased to Mr L. E. Lanier until December 1934, together with the smaller islands of the Amirantes, for Rs 2,000 a year.

St Pierre, although belonging to the Providence group together with Farquhar and Wizard, is quite different in structure from the other islands we had visited already (vide plate V & VI). It is an elevated coral reef more than 30 feet above

the level of the sea and still in its position of growth. Its structure is the same as that of Aldabra and Assumption, while at Astove and Cosmoledo sea sand has been piled up over some parts of the atoll, but in other parts the characteristic structure of elevated reefs is still to be seen. At Farquhar almost all the atoll has been weathered to sea level, sandcays only emerging above water, except 3 small islets which show the reef structure and bear testimony to the way in which the islands of the S. Indian Ocean passed from one stage of their structure to the other.

St Pierre is still a coral reef with its crevices and pits in which guano had accumulated to such an extent that over 150,000 tons have been exported from such a small island which measures under 400 acres. Practically all the high grade guano has been exported, but what remained on the ground when the guano was sifted before being stored is washed down again by rain into the pits and it is probable that about 1,000 tons of guano per annum can still be extracted from St Pierre until the expiry of the lease in 1934. If one considers that the benefit accruing to the Colony by the working and exporting of the guano deposits can be reckoned at Rs 20 per ton at least (including a royalty of Rs 2.50 and an export duty of R. 1) one is impressed by the value of these elevated reefs occurring in the colony which are uncultivable lands and from which guano can be exported without prejudice to the owners. St Pierre which is entirely uncultivable should for this reason not be leased again and reserved as a sanctuary for birds.

We reached Astove on the 2nd of August at 4 p.m. Astove is leased by Messrs Temooljee & Co for Rs 500 a year until 1931 and for Rs 1,500 a year until 1961. This firm acquired the rights of the lessee, Mr d'Emmerez de Charmoy, for Rs 109,000. This island, again, is an elevated atoll reef but one on which sand has been piled up on more than 2/3rds of the rim of land cut down to sea level. The other 1/3rd of the island is still a reef with its crevices and pits in which guano has accumulated. Unlike St Pierre which is a small island of 400 acres, Astove is an atoll measuring 1,200 acres of land encircling a lagoon 1,600 acres in extent. 2/3rds of the land are cultivable and have been planted in coconut palms more or less. The remaining 1/3rd is a reef in which the surface guano is found in so great quantity that a good shallow soil has been formed well adapted to many plants such as Cotton, Sisal, Maize, Teneriffe Onion, Ambrette, Castor Oil. On the whole, I consider Astove as being an island susceptible of more development in the way of small herbaceous plants than along the lines that have been adopted and which consisted in planting coconut palms everywhere to the exclusion of other plants. When I visited it in

1916 I counted 9,864 palms set out of which 4,600 had reached the bearing stage, most of the remaining trees are not yet in bearing, after 15 years. This is a much too long period to wait for a coconut crop. It bears testimony to the unsuitability of many parts of Astove already planted to the culture of coconut palms. As far back as 1906 I called the attention of the lessees to the great variation in the composition of the soil at Astove which on the lagoon side is a stiff mud piled up alongside the remains of the foundation of the island and on the seaside a sandcay which varies in depth from 4 feet near the same foundation to 15 feet near the beach. A coconut palm has to get water from its roots and the roots cannot reach a water table which is at 15 feet under ground. It is only therefore the portions of land nearest the foundation that are more shallow and of the right depth for the requirements of the palm in water. Water is nearer the surface alongside the lagoon, but here, the soil is being formed of sand triturated into chalk by sea organisms and is too stiff for the expansion of the coconut roots.

One can see that the power of resistance of the coconut palms at Astove is lowered by periods of drought and poor soil conditions. These weak trees are attacked by the white scale insect (Chionaspis inday) which has already reduced the crop considerably. The poor soil conditions are such that the nuts only reach half their normal size.

It is doubtful whether these poor soils can be amended easily by manuring, except alongside the coral rock foundation, as already stated, which occupies the middle portion of the West branch of the atoll. There the soil has already been improved in former times by guano deposits and the water table is more within the reach of the coconut palm roots.

The coarse texture of the soil is, besides, a handicap to the general system of manuring which consists in digging large holes close to the tree and filling them up with manure and guano. There is not enough cohesion in the coarse sand particles of the soil to dig proper holes without running the risk of causing them to fall down into the hole, whilst it is being dug out. The tendency is therefore to dig very large holes round half the circumference of the tree at least and upset its balance causing it to topple over and to lean on the ground.

The uppermost layers of the soil are always richer in food element than the lowermost. It is also easier to manure 1 foot deep of soil with guano than to improve the conditions of a soil dug out 10 feet deep at a prohibitive cost. For this reason I consider that the culture of herbaceous plants, maize, cotton, Teneriffe onion, ambrette, castor oil is much more beneficial than that of coconut palms in many parts of Astove. Herbaceous plants can be grown during the rain even in the deep

sandcays poor in food elements and can be manured with guano, as they are surface feeders, while coconut palms are bound to suffer heavily during the dry period, they having to send down their roots in poor soil 8 to 10 feet deep to get at the water table.

The East branch of the atoll, except on those parts that are protected by sand dunes, is too much exposed to the S. E. trade wind to allow it being cultivated on a large scale.

Some of the sea resources at Astove are tapped to their full extent: 400 turtles being captured per annum and turned into calipee and quitouze. Carets are said to have become extinct on this island where they never occurred in great numbers. A certain number of them could however be raised in the lagoon out of which there is no deep passage to the sea outside.

Guano occurs in pits and on the surface at Astove. A considerable amount of pit guano which is merchantable is still left on the island (10,000 tons at least). It is advisable not to touch the surface guano at all, it being of low grade and forming an ideal garden soil in which many herbaceous plants can be grown during the rainy season.

I saw a great many bags of castor oil seeds being shipped from Astove. This plant which grows subspontaneously on the island should be helped in its propagation. The cost of collecting the seeds and packing them are the only expenses to incur, while the price of this article has considerably increased lately, the oil obtained from it being used more and more in lubricating delicate machines. The example shown by the lessees of Astove should be followed everywhere else in the coral islands.

CHAPTER VI.

Cosmoledo.

Cosmoledo, together with Assumption and Aldabra, also belong to the Government. They were leased as far back as 1888 to one Mr Cauvin who started exploiting mangrove timber, then to Mr Spurs from 1890—1900 for Rs 500 per annum. In 1901 Mr Spurs failed to obtain a renewal of the lease which was acquired by Messrs Baty Bergne for Rs 3,000. In 1904 the lease was transferred to Mr d'Emmerez de Charmoy who started exporting guano from Assumption, manufacturing calipee on the three islands and exploiting mangrove bark at Aldabra and Cosmoledo. The lease, after having passed into the hands of Messrs Thomson Williamson in 1913, and afterwards returned to Mr d'Emmerez, was finally transferred to the Seychelles Guano Company in 1923 with certain minor modifications and an increase of the annual rental to Rs 6,000 per annum. The lease expires in August 1931.

We reached Cosmoledo on August 3rd at 8 a.m. after a voyage of 3 hours from Astove. We visited the whole of Menai Island during the day and left the island at 2 a.m. the next morning. It was impossible to go to Wizard Island which is on the opposite side of the lagoon 10 miles away, where there is another settlement and a landing place during the other monsoon. The other islands of the atoll are Moustique South, Pagote, Polyte, Goëlette, Ile du Trou, Grand Nord Est, Petit Nord Est, Middle Island and Observation Island (vide plate VII).

Menai is much like Astove, with a great portion of the land covered with sand, the elevated reef still forming the back bone, so to speak, on which the sand has been piled up from the lagoon inside and from the sea outside. Wizard is also partly covered with sand; South Island, on the contrary, is an elevated reef without piled up sand. The other islands are a mixture of both types of structure, the sand cay formation predominating. Moustique is the remains of an islet which has been worn out by solution and transformed into a mushroom shaped rock on which edible oysters abound.

The lagoon is about 10 miles in diameter and is well known as being the best breeding ground for fish in the colony. It is deep in the centre (3—5 fathoms) and communicates with the sea outside by two large and deep channels on either side of South Island.

The coconut plantations at Menai look even less promising than those at Astove, the palms being covered with the white scale insects (chionaspis inday) and the nuts being so small that it takes 40 of them to make a litre of oil, as compared with 12 in Mahé. The palms are out of place on that island for the same reasons as those mentioned in connection with Astove viz: poor soil and moisture conditions and low resisting power to scale insects. There are hardly any nuts on the majority of the trees under cultivation.

About 50 acres at Menai and 100 at Wizard and other islets can be devoted to maize cultivation, but we found that very little maize was grown this year on these two islands.

The whole efforts of the lessees seem to be concentrated on the fishing of turtles of which 6,800 for the whole group of islands are captured per annum for the manufacture of calipee and quitouze. The other sea resources are not exploited.

This year, however, a contractor started manufacturing preserved yolk of eggs during the breeding season of the sooty tern (Sterna fuliginosa). These birds visit periodically the Seychelles archipelago and lay their eggs on the ground of the sparsely inhabited islands, such as Wizard in the Cosmoledo group. They select pieces of ground which are fairly level and not occupied by trees or bushes. If they are not disturbed, the

females lay only one egg ; but if the egg is removed by fishermen, a second and eventually a third laying occurs during the year from May to September, after which time they are not to be seen in the archipelago until the next season. The contractor succeeded in manufacturing 35 casks or 6 tons of yolk preserved in salt and boric acid, but his harvest fell short of his expectations and he has eventually lost money in his enterprise.

There are great possibilities in the development of the sea resources of Cosmoledo. The lagoon harbours also about 400 acres of mangrove swamp adjoining Menai island. These trees were exploited about 20 years ago for their bark which was then sold at a remunerative price. Young trees have replaced the old ones that were felled and the swamp is now a thick forest of saplings which can eventually be turned into rafters. They are straight poles second to none for building small houses in the colony, and I reckon that 50,000 of them can be produced at Cosmoledo. The other parts of the lagoon are too much exposed to the in-going and out-going currents to allow the formation of mangrove swamps, as at Aldabra, when there is only one main passage to the sea outside and where the conditions of growth of those trees are better. It is very likely that some day better advantage will be taken of that Government reserve of mangrove trees at Cosmoledo and Aldabra for the manufacture of charcoal, wood alcohol, wood tar and wood oil and for running internal combustion engines for which this wood is so well adapted.

I reckon that Cosmoledo can produce at least :

50 tons of maize worth	... ...	Rs 5,000
600 turtles worth ...	... ...	„ 6,000
4 tons of trepangs ...	... ...	„ 2,000
30 tons of salt fish (minimum)	... ...	„ 4,800
birds eggs ...	... ...	„ 1,000
coconuts ...	... ...	„ 360
	Total	... Rs 19,160

from which the working expenses and those of running a ship every 3 months have to be deducted.

Chapter VII.

Assumption.

We left Cosmoledo at 2 a.m. on the 4th August and landed at Assumption at 11 a.m. on the same day. We visited the settlement where all the work of extracting, storing and sift-

ing guano, as well as that of manufacturing calipee and quitouze, are being carried out within a radius of a mile only. Guano deposits in all the other parts of Assumption have been exploited long ago by the former and present lessees.

We were much impressed by the numerous stone buildings which the present lessees have erected viz : two conerete tanks containing 94,000 gallons of rain water, 3 guano sheds adjoining one another in which 10,000 tons of guano can be stored and a pier 270 feet long and 15 feet above low water for the loading of vessels and steamers, besides store rooms, bungalows and ample other accommodations for a large colony.

By giving two gallons of water a day to each labourer, there is enough water stored at Assumption for 100 men during 8 months, and it is very seldom that the dry season extends over more than 6 months of the year without any shower of rain.

Assumption is essentially an elevated reef without sand cays, except alongside the S. W. Coast where the sea has eaten up a wide ledge, measuring about 50 acres where sand has been piled up (vide plate VIII) Alongside the W. Coast which forms a bay, the island being crescent shaped, sand has only been piled up by the sea on the top of the cliff, forming a shallow layer only a few yards wide, while near the settlement in the S. W. the layer is 8 to 15 feet deep and has been formed on the top of the ledge cut out by the sea to over 100 yards inland. In the S. E. the elevated reef has also been cut out into a ledge about 1 mile wide, but here the sand derived from the destruction of the reef has been piled up inland on top of the reef into several high sand dunes, the highest measuring 90 feet high. In the neighbourhood of these sand hills there is enough soil accumulated for the culture of ground provisions over 50 acres. I consider there are on the whole 3 to 400 acres in Assumption, where low grade guano covers the ground, which are suitable for maize. I have seen already patches of surface guano not only being used for that purpose, but also for that of growing sweet potatoes, and there are many guano pits that are occupied by clumps of bananas. It is worth recording that bananas do quite well in pits on islands of purely coral origin, provided there is enough guano in which to plant them, and that they are sheltered from the dry S. E. wind, which are so detrimental to the tender leaves of that plant.

The island was surveyed by me several times in 1906, 1909, 1910 and 1916, and it was only after 3 investigations that I found it possible to work out the amount of high grade guano which I estimated at 100,000 tons, besides the surface guano of low grade which I estimated at over 200,000 tons in 1910. The pits and crevices are basin-shaped or vessel-shaped, and most of them are filled up to the rim, so it was not an easy

matter to find out all the pits occurring on 2,700 acres and to measure their contents. There are about 20,000 tons of guano left on the island, while more than 80,000 tons have been exported.

These islands, which are elevated coral reefs, do not lend themselves to the culture of coconut palms ; consequently there is no danger in exporting from them the guano deposits which would otherwise have been of so much benefit to the palms. The surface guano remaining on these elevated islands will always provide a sufficient supply for the culture of maize, ambrette, castor oil, sisal, sweet potatoes, &c. for the culture of a few hundreds of coconut palms that can be grown near the settlement.

The manager of Assumption is to be congratulated on having applied a method recommended long ago, expensive though it is, of bringing coconut palms into heavy bearing in sand cays 12 feet deep on elevated reef islands. In 1925 he showed me a few holes 15 feet in diameter which he was digging out right down to the floor of the sand cay, and how he managed by building a wall of lime-stones to prevent the sand sliding down the holes and chocking the young palms which he was setting out at 4 feet below the surface of the ground. These holes were manured with 20 to 30 bags of guano (2,000 to 3,000 lbs). Two adjacent holes nearly touch each other. Within 4 years these palms came into bearing and were putting forth at the time of our visit huge bunches of fruits second to none in the colony, while other trees in the neighbourhood planted by his predecessor on the surface of the ground looked all yellowish and stunted. Planting coconut palms in such a way, although the quantity of guano used considerably exceeds the requirements of the trees, is a commercial proposition and it is the only way, if coconuts must be grown, of getting out of the dilemma which consists of either adopting such costly methods or cheaply growing sickly trees set out in small holes, such as those of Astove and Cosmoledo. Unless coconut planting is practised in that way it is far better to grow instead, in the elevated reef islands, maize and other ground provisions and other herbaceous plants which are surface feeders and remain in the ground for a short period of time.

Assumption also abounds in other sea resources, but as soon as the island became inhabited in 1909 and the exploitation of guano was started, all the land and sea birds were destroyed by the labourers. It is however wonderful to think that after 19 years of constant fishing the resources in turtles have not been depleted, except to a slight extent. 1,000 turtles are still captured per annum. The theory by which it is said that turtles do not come ashore, except a few, during the months of July to November does not always hold true, as I quite remember that in September 1906 I counted 200 turtles forming black dots against the clear bottom of the sea in the bay at Assumption, when I anchored there for the first time

The policy of planting timber trees at Assumption which was inaugurated 10 years ago has given excellent results. The lessees are allowed to cut down shrubs to get firewood free of royalty for the manufacture of calipee, on the conditions that timber trees are set out to make up for the deficiency. About 4 to 500 cedars set out near the settlement are very luxuriant and will eventually become valuable timber trees. It is advisable that the planting of the same trees should be started as wind breaks in other parts of the island, especially at the foot and on the sides of the huge sand hills in the extreme North end of the island and all along the West Coast.

Chapter VIII.

Aldabra.

We reached Aldabra at 6 p.m. on August 4th. The next morning we visited the establishment and plantations. We proceeded with a motor boat in the afternoon of the same day to inspect that part of the lagoon where timber is being exploited, 10 miles away from the settlement. It is very fortunate that Your Excellency had thought of taking over a motor boat from the Port Office. Without such means of navigation a lagoon which is 20 miles long and 6 miles wide cannot be visited in a day or 2. On the following day we managed to visit the other end of the island beyond the lagoon and to return to the settlement after a trip of 15 hours. Without a motor boat it would have taken us 24 hours to reach that part of the island and a little less time to come back. The considerable distance which separates the different parts of Aldabra from one another can be gathered from the above remarks. The island, including the lagoon, is just the size of the Isle of Wight (vide plate IX). Much was expected from the lessees for the development of its numerous resources, but up to now very little is done besides the exploitation of very little timber and turtle fishing for the manufacture of calipee and quitouze. No efforts are made towards planting the island, except to continue the clearing of some 25 acres of coconut palms set out by Mr Spurs in 1895. These trees are doing uncommonly well, especially those that have been manured. I noticed the appearance of the white scale, here and there, and showed this very dangerous parasite to the manager. I explained to him the method of treatment which it is imperative to adopt before it is too late.

There are several parts of Aldabra which are not inviting to look at from an agricultural standpoint. It is an elevated reef with a huge lagoon and innumerable islets in the middle and on the inland sides. In the lagoon there is room enough for an

We left that island with the impression that it was not the least valuable gem among the other islands of the Amirantes group and that we were only sorry to be pressed by time, as we thought we did not do it justice in not visiting it all over. The landscape at Poivre is adorned by Bois Blanc (Hernandia peltata) set out in lines as props for vanilla in the 70s which have now grown into huge timber trees 4 to 6 feet in girth at breast height. These old trees together with a fine residence at the back of them were a fitting panorama to behold on the last day of our interesting visit.

We sailed homewards the same night and reached Mahé on the 16th of August, the captain of the schooner having pulled us through many hardships in the most obliging and sportmanlike manner.

I have the honour to be,
Your Excellency's most
Obedient Servant,
P. R. DUPONT,
Director of Agriculture.

20th August, 1929.